

Translation

PATENT COOPERATION TREATY

PCT/EP2003/010429



PCT

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference M/42205-PCT	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/EP2003/010429	International filing date (day/month/year) 18 September 2003 (18.09.2003)	Priority date (day/month/year) 19 September 2002 (19.09.2002)
International Patent Classification (IPC) or national classification and IPC C08F 4/14		
Applicant BASF AKTIENGESELLSCHAFT		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 1 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 19 April 2004 (19.04.2004)	Date of completion of this report 25 August 2004 (25.08.2004)
Name and mailing address of the IPEA/EP	Authorized officer
Facsimile No.	Telephone No.

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/EP2003/010429

## I. Basis of the report

### 1. With regard to the elements of the international application:\*

☐ the international application as originally filed

☒ the description:

pages 1-7, as originally filed

pages, filed with the demand

pages, filed with the letter of

☒ the claims:

pages, as originally filed

pages, as amended (together with any statement under Article 19

pages, filed with the demand

pages 1-4, filed with the letter of 17 July 2004 (17.07.2004)

☐ the drawings:

pages, as originally filed

pages, filed with the demand

pages, filed with the letter of

☐ the sequence listing part of the description:

pages, as originally filed

pages, filed with the demand

pages, filed with the letter of

### 2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language which is:

☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).

☐ the language of publication of the international application (under Rule 48.3(b)).

☐ the language of the translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

### 3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

### 4. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages

☐ the claims, Nos.

☐ the drawings, sheets/fig

### 5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).\*\*

\* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rule 70.16 and 70.17).

\*\* Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/EP 03/10429

## V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

### 1. Statement

Novelty (N)	Claims	1-4	YES
	Claims		NO
Inventive step (IS)	Claims	1-4	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-4	YES
	Claims		NO

### 2. Citations and explanations

#### 1. Subject matter of the application

The subject matter of the application is a method for producing polyisobutene with a molecular weight of 500 to 50,000 and a terminal vinylide group content of at least 75%, characterized in that a boron trifluoride catalyst with two complex builders, the first of which is a tertiary alcohol, in particular tertiary butanol, and the second is water, a primary or secondary alcohol, or a carboxylic acid.

#### 2. Prior art

WO02/38630 describes a method for producing polyisobutene with a terminal vinylide group content greater than 80%, using a boron trifluoride complex catalyst with tertiary alcohols and secondary alkyl ethers in place of water, a primary or secondary alcohol or a carboxylic acid.

The ratios of the quantities of boron trifluoride to the co-catalyst and of ether to tertiary alcohol are, however, within the claimed range (see page 9, lines 12-23).

EP1 026 175 (mentioned in the application) describes a method for producing polyisobutene with a terminal vinylide group content greater than 80%, using a boron

trifluoride complex catalyst with ether. Optionally, an alcohol can be used as a further complex builder. Tertiary butanol is also one of the alcohols listed. Only ethanol is used in the examples and, in fact, only a very small quantity thereof is used, far less than the claimed quantitative ratio of c:b.

US 5,286,823 (mentioned in the application) describes a method for producing polyisobutene with a terminal vinylide group content of over 80%, using a boron trifluoride complex catalyst with secondary alcohols, optionally in a mixture with dialkyl ethers (see column 7, line 62 to column 8, line 60 and column 10, lines 43 -56). There is no mention of the use of tertiary alcohols.

### 3. Novelty (PCT Article 33(2))

In view of the features that distinguish the claimed subject matter from the available prior art (see above), the novelty of the subject matter of the present claims 1-4 can be acknowledged.

### 4. Inventive step (PCT Article 33(3))

The problem to be solved was that of providing a further method for producing polyisobutene with a high vinylide group content.

The closest prior art is WO 02/38630 (see above).

WO02/38630 describes a method for producing polyisobutene using a boron trifluoride complex catalyst with tertiary alcohols and secondary alkyl ethers.

The use of water, a primary or secondary alcohol, or a carboxylic acid in combination with tertiary alcohols as complex builders is not rendered obvious by the available

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prior art.

Therefore, an inventive step can be acknowledged for the subject matter of present claims 1-4.

5. Industrial applicability (PCT Article 33(4))

Since the production of reactive polyisobutene is an important technical process, industrial applicability can be acknowledged.